MEETING SUMMARY

Marine Corps Base (MCB) Camp Lejeune Restoration Advisory Board (RAB) Meeting Minutes

MEETING DATE:	August 20, 2025	
LOCATION:	Coastal Carolina Community College, Business Technology Building, Jacksonville, North Carolina	
ATTENDEES:	Thomas Richard/MCB Camp Lejeune	Matt Louth/CH2M
	Laura Spung/MCB Camp Lejeune	Monica Fulkerson/CH2M
	David Towler/MCB Camp Lejeune	Dan Hockett/CH2M
	Jennifer Tufts/ EPA	Dylan Elks/Meadows
	Josh Hanks/NCDEQ	Ben Francisco/NAVFAC (virtual)
	Laura Bader/RAB Co-Chair	Thomas Mattison/RAB member
	Riley Lewis /RAB Member	Col Steven Thompson/RAB Member
	Michael Curtis/RAB member	Taren Carranza/Guest
FROM:	Monica Fulkerson/CH2M	
DATE:	September 23, 2025	

I. Welcome and Introductions

Mr. Richard began the meeting, introduced the team, and explained the purpose of the RAB. Mr. Richard presented awards to Mr. Mattison and Ms. Bader for 30 years of service on the RAB.

II. MCB Camp Lejeune Treatment Technology and System Overview

Objective: The purpose of this agenda item is to review constituents of concern (COCs), treatment technologies, site specific treatment systems at Site 35 (air sparging), Site 89 (air sparging), and Site 82 (air stripping with groundwater extraction).

Overview: A presentation was reviewed by Mr. Elks.

The Navy Installation Restoration Program (IRP) was established to reduce the risk to human health and the environment from past waste disposal operations and hazardous substance spills at Department of Navy facilities. The goal is to provide for cost-effective and timely site assessment, planning, and remediation of identified releases consistent with Defense Environmental Restoration Program requirements. The IRP focuses on assessing and remediating environmental releases. The sites discussed in this presentation focus on addressing Chlorinated Volatile Organic Compounds (CVOCs). These CVOCs include: degreasing agents – used to clean metal parts in automotive, aerospace, and manufacturing industries; dry cleaning – tetrachloroethylene (PCE) is a primary solvent in commercial dry cleaning; paint and varnish removers – chloroform and methylene chloride are used in formulations to strip coatings; adhesives and sealants – some chlorinated solvents are used as carriers or thinners; and chemical intermediates – vinyl chloride (VC) is a precursor for producing PVC (polyvinyl chloride).

One of the treatment technologies applied at MCB Camp Lejeune is air sparging. Air sparging is where clean air is injected under pressure into the saturated zone (below the water table) through wells. As the air rises through the groundwater, it volatilizes (transfers into the gas phase) the VOCs. This process can also enhance aerobic bioremediation by encouraging growth of bacteria that consume VOCs.

Site 35 had multiple known and unknown sources, including former vehicle maintenance garage and weapons cleaning areas, as well as petroleum impacts from the former fuel farm. The primary contaminants at Site 35 are trichloroethylene (TCE), cis-1,2-dichloroethane (DCE), and VC. The Site 35 Air Sparge System consist of a 60 Horsepower rotary screw compressor and one "double ended" or "continuous" horizontal air sparge well, made of 4" HDPE. The well has a total length of 1,000 feet, including a 500-foot screen placed 50-feet deep. The average flow rate is approximately 150 CFM. The Site 35 Air Sparge System operated from 2010 to 2013, then 2020 to present. The system was taken offline in 2013 due to 71% total contaminant reduction in source area wells and 75% total contaminant reduction in deeper aquifer wells within the estimate radius of influence. Due to persistent VC concentrations in the aquifers, the system resumed operation in 2020. A treatability study is underway to assess effectiveness of air sparge. To-date, treatment data indicates effective contaminant reduction in the aquifers.

Site 89 was the former Defense Reutilization and Marketing Office (DRMO) and Base motor pool. The primary contaminants are 1,1,2,2, - tetrachloroethane (PCA), TCE, and VC. The Site 89 Ais Sparge System consists of a 250 HP rotary screw compressor that produces 200-260 cfm feeding two "single entry" horizontal AS wells, each made of 4" Schd 80 PVC. The wells are 830-feet and 930-feet in total length, with 600-foot and 700-foot screens located 45 feet deep. The system produces 200-260 cubic feet per minute. Operation began in 2013. The system remains fully operational and mechanically sound. Air sparging has had the most significant impacts reducing concentrations in northern vicinity of the groundwater plume. Air sparging is only one of several treatment technologies used at Site 89.

Another treatment technology applied at MCB Camp Lejeune is air stripping. Air stripping is where extracted groundwater containing CVOCs is injected into the top of an air stripper and clean air is injected through the bottom. The water is separated into small droplets to maximize surface area, and a counter current of influent and clean air is created, volatizing dissolved VOCs out of solution and into gas phase.

Site 82 is also a former DRMO, used for equipment and chemical storage and storage and disposal of wastes. Site 82 consists of the eastern portion of Lot 203. Contaminants include CVOCs and metals in both the shallow and deep aquifers. The treatment system was constructed in 1996 to treat CVOCs and metals (metals treatment was for shallow influent only and was discontinued in 2009). The primary CVOCs at Site 82 are cis- and trans-1,2-DCE, PCE, TCE, VC, 1,1,2,2 – PCA, 1,1,2-TCA and 1,1-DCE. An as-built process flow diagram of the treatment system was reviewed. There are two primary types of air strippers: packed column and sieve tray. Site 82 has utilized both historically and is currently using two sieve trays to treat combined influent and one dedicated shallow-influent sieve tray. Pre-2016 data indicated incomplete and unreliable treatment from the packed column tower air stripper, caused by mineral fouling (iron and calcium) leading to channeling of water. Impaired air stripping resulted in premature depletion on carbon filter media and, ultimately, CVOCs discharging to Wallace Creek. To improve air stripping efficiency at Site 82, a dedicate shallow influent sieve tray air stripper was installed (2016). The packed column tower was then replaced by two sieve tray air strippers (2019). Since the installation of the three sieve tray air strippers, CVOC treatment efficiency has remained at 100%. In addition to protecting Wallace Creek, improved air stripping has decreased required maintenance significantly. GAC media replacement is down from once per year to more than 5 years (last replacement was in 2020), saving more than $58,000 to $80,000 per year ($290,000 to $400,000 savings-to-date). Additionally, backwashing of GAC and sand filters are down from one to three times per week to once or twice a month and cartridge filters changeouts down from one to three times per week to twice per month. Currently, the Site 82 GWTP treats 9 to 12 million gallons of groundwater per month and removes 100 to 250 pounds of VOC mass from groundwater per month. Since inception, the Site 82 GWTP has treated over 1.5 billion gallons of groundwater and has removed approximately 225,000 pounds of VOC mass from groundwater.

With respect to system operations and maintenance (O&M), air sparge O&M is generally low, consisting of daily flow/ pressure readings, annual preventative maintenance (oil, filters, belts etc.), occasional repairs or replacement of mechanical components, and repair of electrical damage from storms. O&M efforts for air stripper units are generally low and include daily pressure readings, annual tray cleaning, annual gasket replacement, and occasional blower or pump replacement / repair. Most O&M efforts are in support of supplementary equipment related to groundwater extraction, including daily system checks and flow readings, bi-weekly filter media (carbon and sand) backwashing, bi-weekly cartridge filters changes, monthly performance sampling, and occasional extraction well pump cleaning.

III. Pilot Study for Treatment of Perfluoroalkyl and Polyfluoroalkyl Substances in Liquid Investigation Derived Waste

Objective: The purpose of this agenda item is to present the objectives, design, methods, results, and path forward for a pilot study investigating the treatment of per- and polyfluoroalkyl substances (PFAS) in liquid investigation derived waste (IDW).

Overview: A presentation was reviewed by Mr. Hockett.

The objectives of the pilot study are to evaluate on-site treatment of liquid IDW generated during on-going investigations of PFAS to offer cost-effective flexibility and to evaluate and select a technology to treat PFAS in liquid IDW to levels below 1 ng/L (nanograms per liter or parts per trillion) or laboratory detection limits for the 5 PFAS that had an EPA risk-based Regional Screening Level (RSL) in late 2022, based on the Work Plan finalized in April 2023. Changes in Department of Defense policy and regulatory guidance since the work plan have resulted in evaluating the 8 PFAS typically included in investigations against DOD-approved screening levels for Preliminary Assessments/Site Inspections.

Mr. Hockett explained that contaminants bind to the adsorbents, letting the cleaned water pass through, while the contaminant stays behind. The IDW pilot study system design included three treatment trains with a primary adsorbent [granular activated carbon (GAC) or Fluoro-Sorb (FS)] followed by secondary ion exchange (IX) polishing, as follows:

1. GAC1 → Post-GAC IX
   Calgon F400 → Purofine A694E
2. GAC2 → Post-GAC IX
   Evoqua UC1240LD → Purofine A694E
3. FS → Post-FS IX
   Cetco Fluoro-Sorb → Purofine A694E

A bag filter is in place to remove solids before treatment. GAC trains are designed for 3 gallons per minute (gpm) and the Fluoro-Sorb train is designed for 8 gpm.

The pilot study was conducted with 3 runs, consisting of a 250-gallon tote of groundwater for each run from sites with high PFAS concentrations (5,000-35,000 ng/L). The pilot study runs were processed through each treatment train and samples were collected at each step of the treatment train. In between the second and third pilot study runs approximately 3,700 gallons of other PFAS IDW was processed to load treatment media.

For the 3 pilot study runs, effluent samples were non-detect for all PFAS with RSLs (Nov-2023), except for PFHxA (0.51 and 0.75 J ng/L) and PFOS (2.6 ng/L). Individual post-sorbent samples collected throughout the treatment system were all below the pilot study goal of 1 ng/L except at Site 116, where PFOS influent concentrations were higher (i.e., PFOS at 25,000 ng/L).

Approximately 5,800 gallons of IDW has been treated by the IDW pilot study system (not including the 750 gallons in the 3 pilot study runs above, for a total of approximately 6,550 gallons). Total effluent and

(in some cases) total influent samples were collected per IDW batch – 12 batches, with batch volumes between 250 and 750 gallons. Post-treatment samples were consistently below SLs, except three batches. Two of these batches were reprocessed with results below SLs. The third batch is awaiting reprocessing.

After treating approximately 1,500 gallons through Fluoro-Sorb train, the flow was reduced to less than 1 gpm, so the use of the Fluoro-Sorb train was discontinued. After treating approximately 2,150 gallons through the UC1240 GAC train, effluent batch results indicate approximately 97% PFAS removal, but did not achieve the pilot study treatment goal. The F400 GAC treatment train has treated approximately 2,900 gallons and is under further evaluation to remove PFAS.

As a result of the pilot study, several operational considerations are noted. With respect to solids management, in one IDW run where effluent batch results exceeded SLs, solids were observed in effluent. The other two IDW runs where effluent batch results exceeded SLs were possibly influenced by residual solids in the totes. With respect to flow capacity, the system has processed approximately 6,550 gallons total. Both GAC/IX trains have maintained design flow (3 gpm) with little pressure loss (3-5 psi). The FS/IX train has slowly reduced flow capacity with a maximum flow less than 1 gpm with 13-15 psi loss. Part of the intent of the study is to optimize the operation of this type of system.

The path forward for the pilot study is to process the remaining 2,500 gallons through the treatment system using the GAC1 (F400) treatment train and to confirm media breakthrough conditions. Disposal facilities for the used media will be explored and a pilot study report will be prepared. For future applications, the need for potential reconfiguration will be evaluated, including the need for IX, backwash capability, backwash liquid management, enhanced solids removal pre-treatment, and the long-term feasibility of treatment system.

IV. RAB Business

Mr. Richard announced that the UXO-31 public meeting video is posted on the RAB webpage. Ms. Lewis asked if a future topic could include an update to the ongoing work at Site 111, Camp Davis. Mr. Curtis asked for a total cost spent since the RAB was initiated and a presentation on how that money has been spent. NAVFAC responded that estimates could be provided. The next RAB meeting is planned for November/December 2025.

MCB CAMP LEJEUNE
TREATMENT TECHNOLOGY & SYSTEM OVERVIEW

- Site 35 Air Sparge
- Site 89 Air Sparge
- Site 82 Air Stripping with Groundwater Extraction

August 2025

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

NAVFAC

MEADOWS
CONSULTING | MANAGEMENT | PLANNING

U.S. MARINE CORPS
CAMP LEJEUNE, N.C.

NC
Environmental Quality

OBJECTIVE

- Overview of Constituents of Concern
- Treatment Technologies
- Site Specific Treatment Systems
  - Site 35 – Air Sparge
  - Site 89 – Air Sparge
  - Site 82 – Air Stripping with Groundwater Extraction
- O&M

COC OVERVIEW

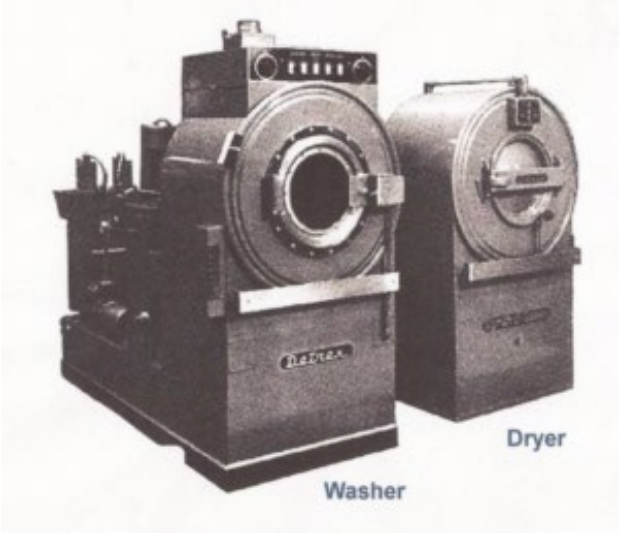
Navy Installation Restoration Program (IRP)

- Established to reduce the risk to human health and the environment from past waste disposal operations and hazardous substance spills at Department of Navy facilities
- Goal is to provide for cost-effective and timely site assessment, planning, and remediation of identified releases consistent with Defense Environmental Restoration Program requirements
- Focuses on assessing and remediating environmental releases including
- Sites in this presentation focus on addressing Chlorinated Volatile Organic Compounds (CVOCs)

COC OVERVIEW

CVOCs

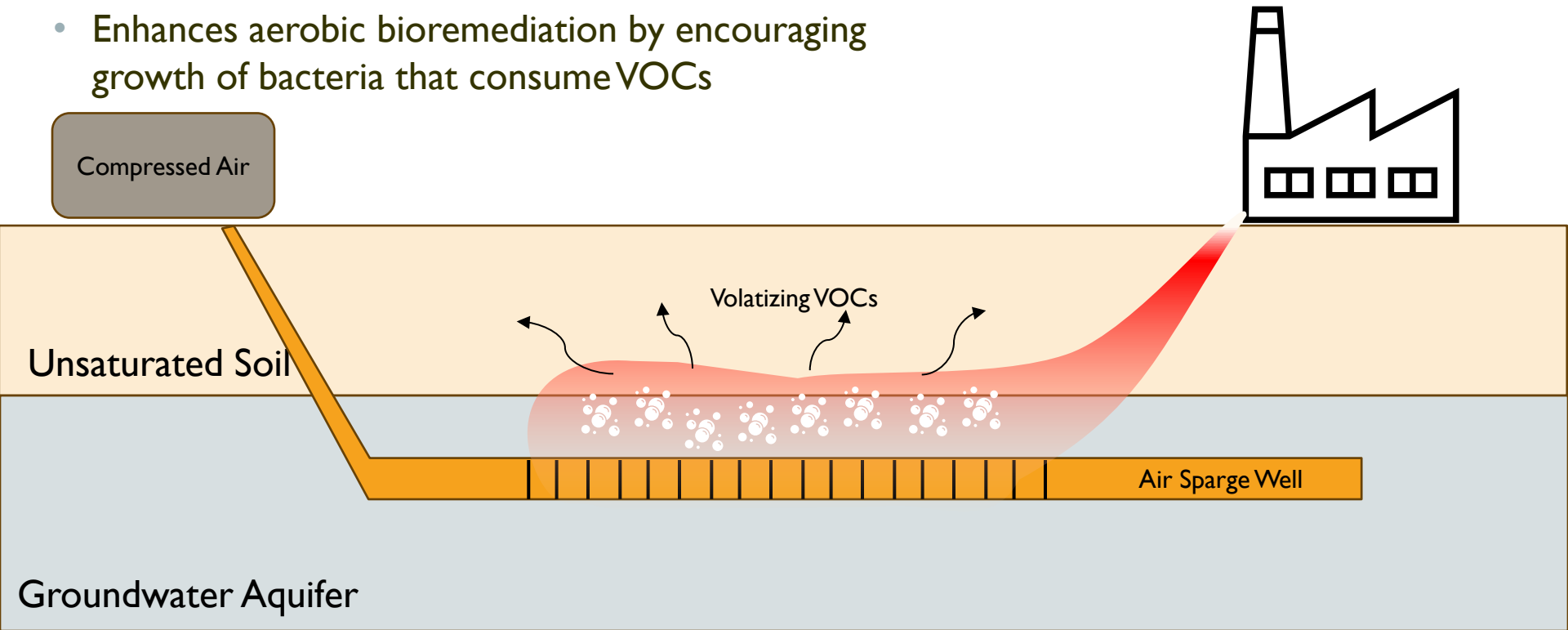
- Degreasing agents – Used to clean metal parts in automotive, aerospace, and manufacturing industries.
- Dry cleaning – Tetrachloroethylene (PCE) is a primary solvent in commercial dry cleaning.
- Paint and varnish removers – Chloroform and methylene chloride are used in formulations to strip coatings.
- Adhesives and sealants – Some chlorinated solvents are used as carriers or thinners.
- Chemical intermediates – Vinyl chloride (VC) is a precursor for producing PVC (polyvinyl chloride).



TREATMENT TECHNOLOGIES

Air Sparging

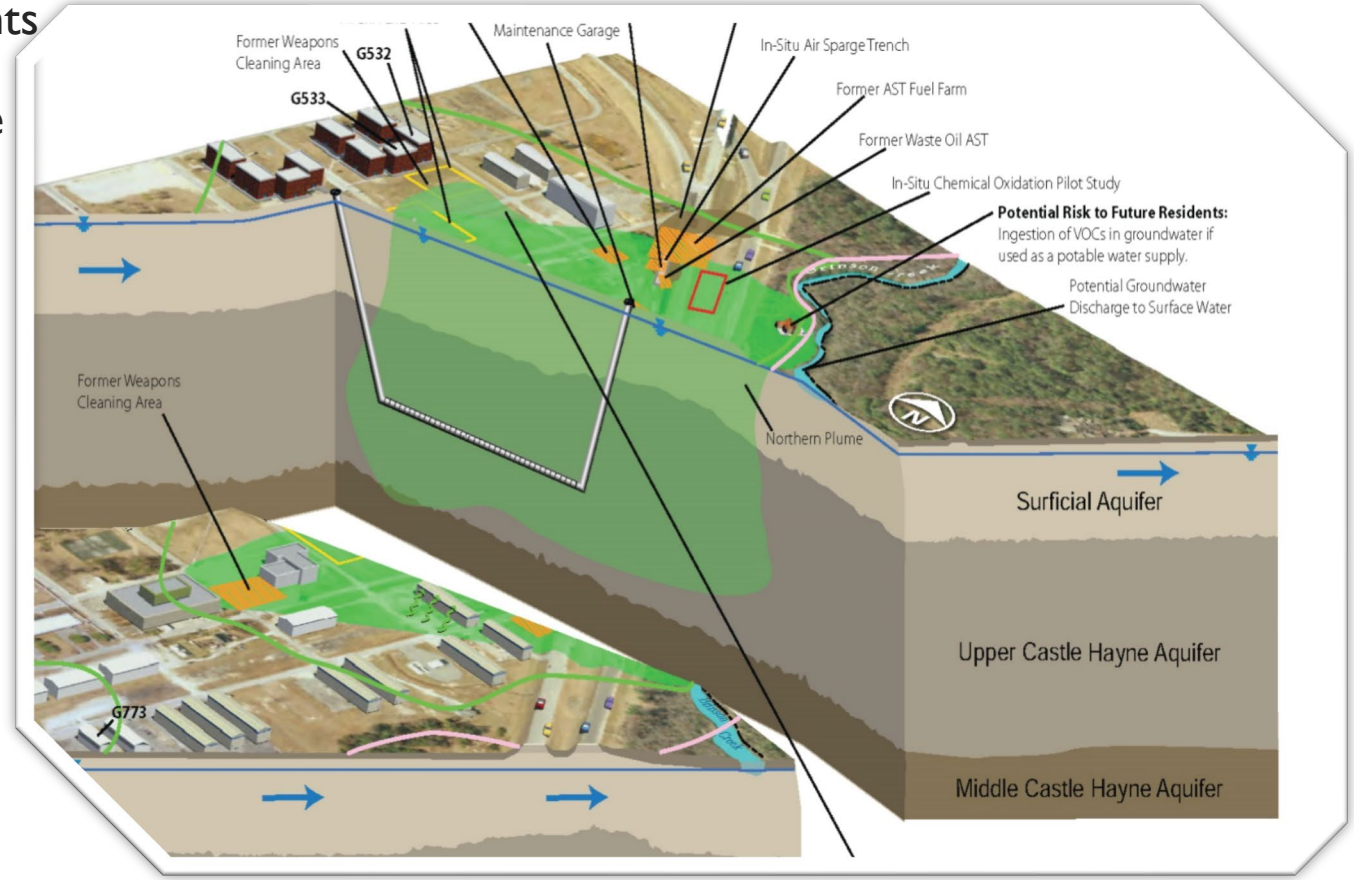
- Technology where clean air is injected under pressure into the saturated zone (below the water table) through wells.
- As the air rises through the groundwater, it volatilizes (transfers into the gas phase) the VOCs
- Enhances aerobic bioremediation by encouraging growth of bacteria that consume VOCs



SITE 35 AIR SPARGE

Site 35

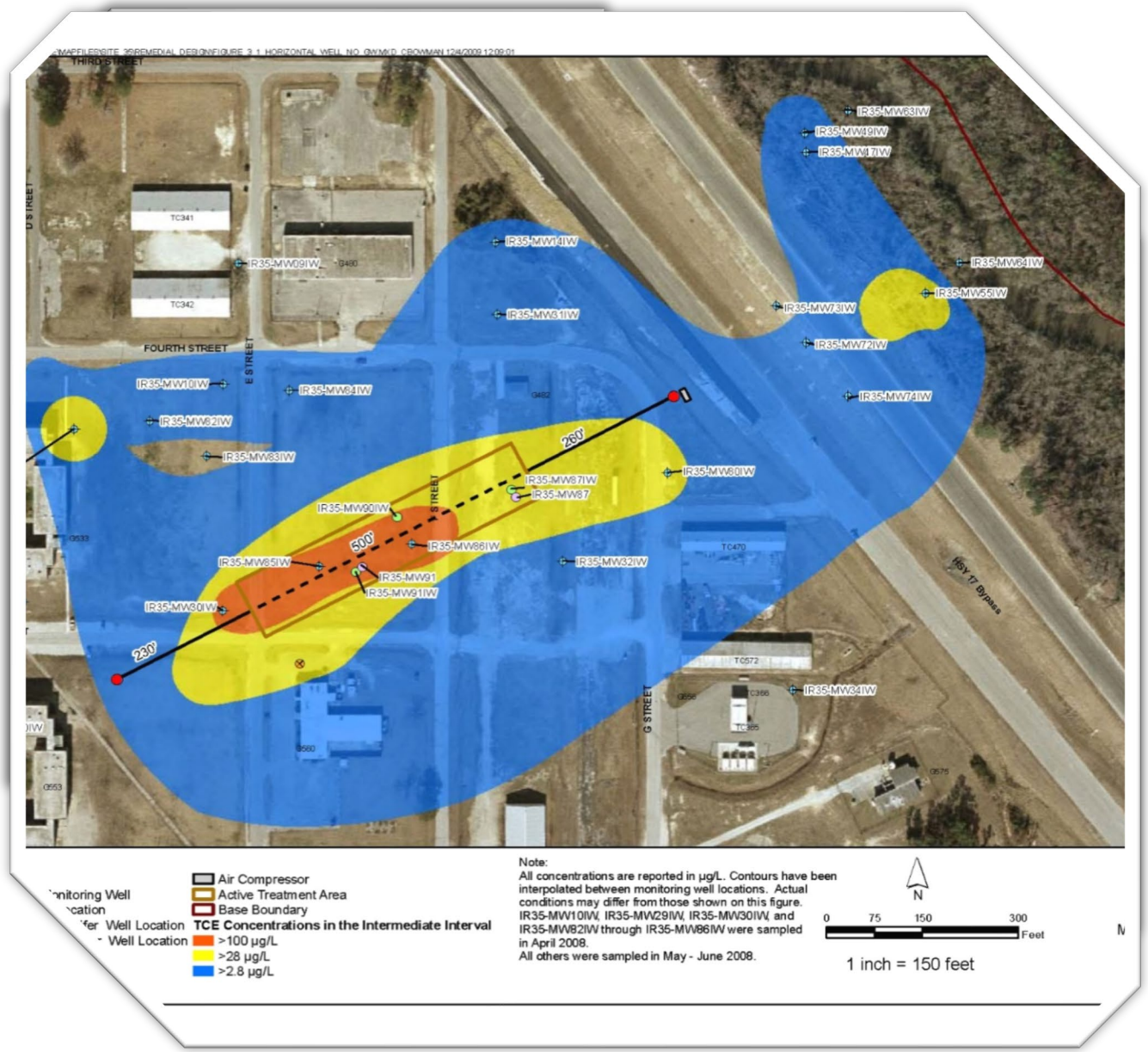
- Multiple known and unknown sources. Former vehicle maintenance garage and weapons cleaning area. Also, petroleum impacts from former fuel farm.
- Primary contaminants
  - Trichloroethylene (TCE)
  - Cis-1,2-dichloroethane (DCE)
  - VC



SITE 35 AIR SPARGE

Site 35 Air Sparge System

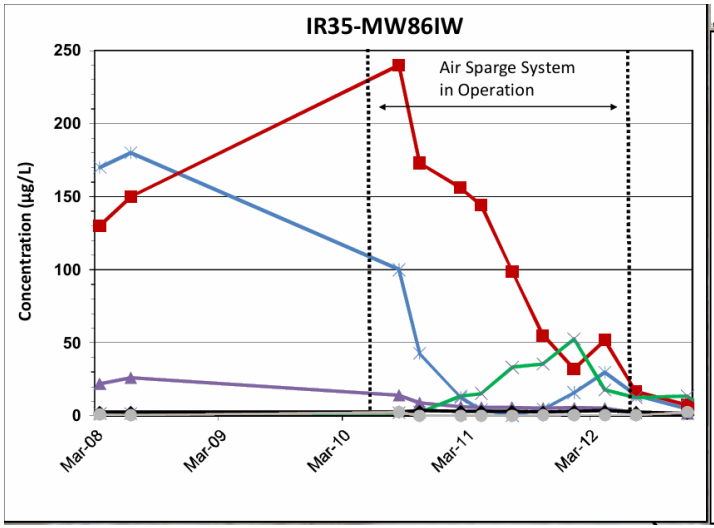
- 60 Horsepower rotary screw compressor
  - One "double ended" or continuous" horizontal air sparge well
    - 4" HDPE
    - 1,000' Total Length
    - 500' screen
    - 50' deep
  - Flow rates average approximately 150 CFM

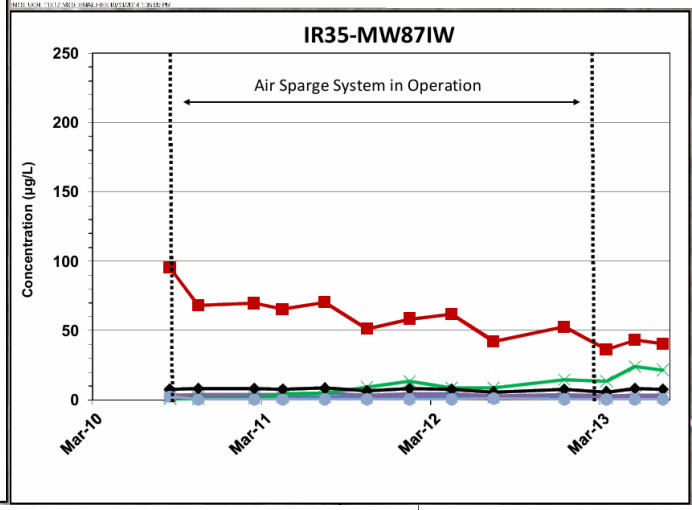


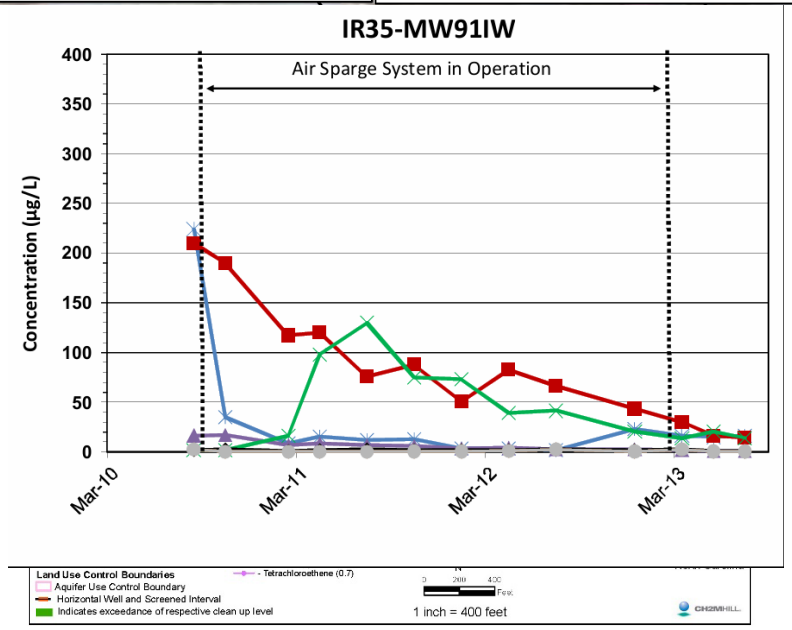
SITE 35 AIR SPARGE

Site 35 Air Sparge System

- Operation:
  - 2010 to 2013
  - 2020 to present
- Taken offline in 2013 due to 71% total contaminant reduction in source area wells and 75% total contaminant reduction in deeper aquifer wells within the estimate radius of influence







SITE 35 AIR SPARGE

Site 35 Air Sparge System

- Due to persistent VC concentrations in the aquifers the system resumed operation in 2020
- Treatability Study to assess effectiveness of air sparge is ongoing
- To-date treatment data indicates effective contaminant reduction in the aquifers

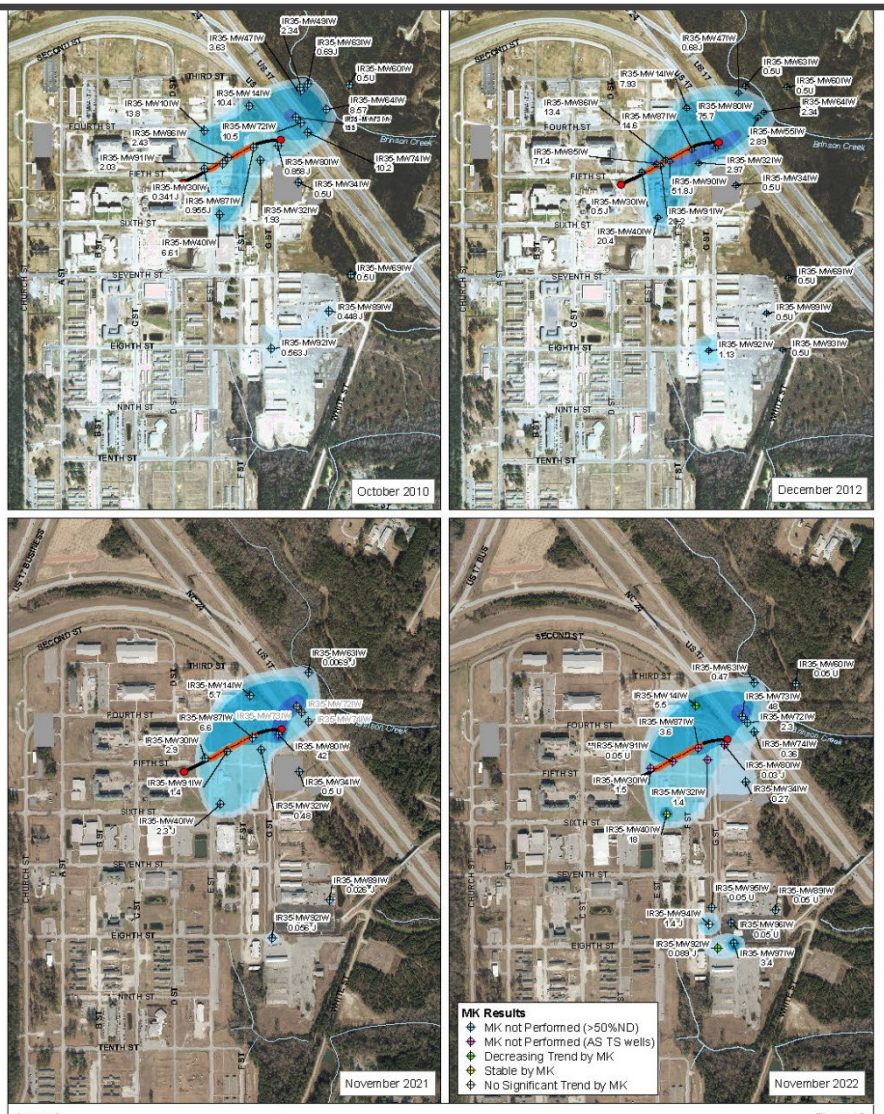
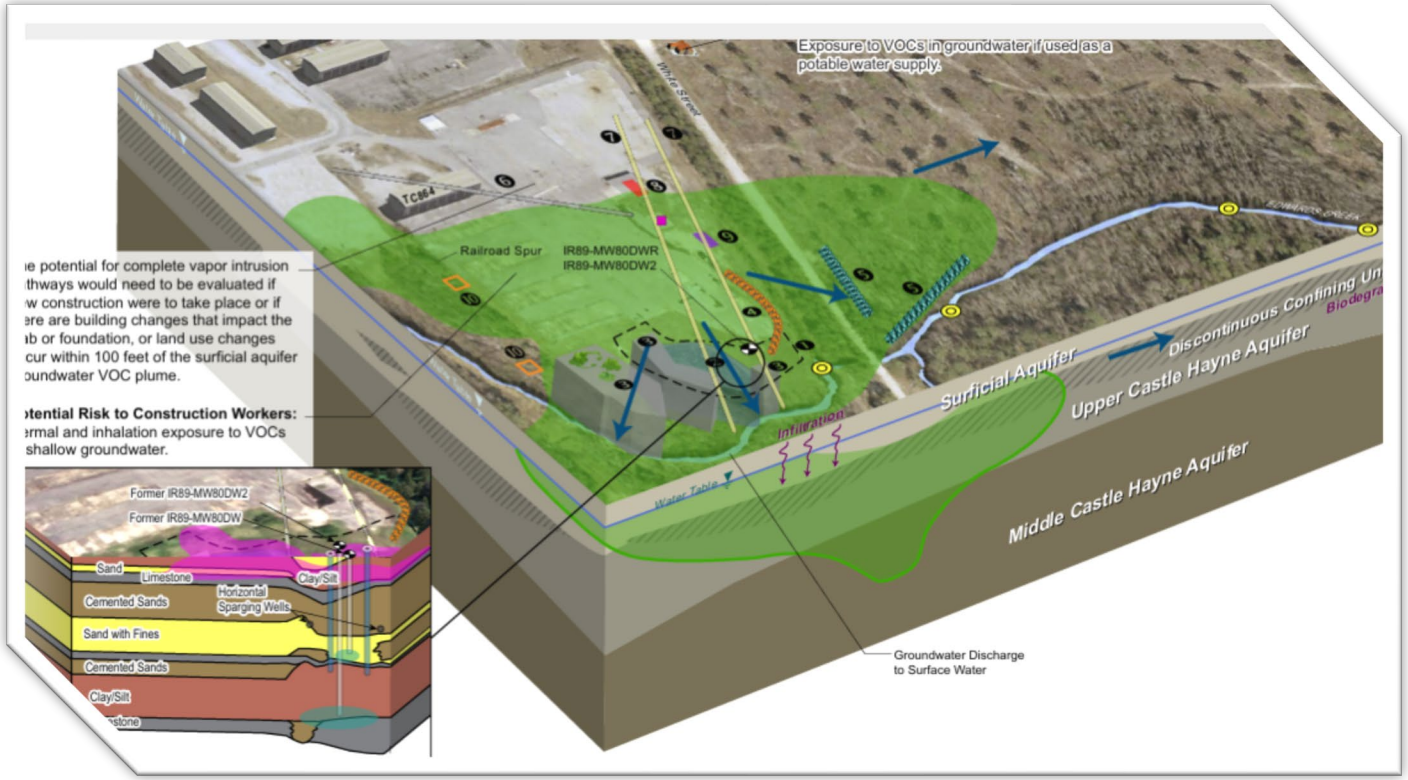


Figure 13
Approximate Extent of VC Exceedances in the UCH Aquifer
Site 35 Long-Term Monitoring Report FY 2023
MCB Camp Lejeune and MCAS New River
North Carolina

SITE 89 AIR SPARGE

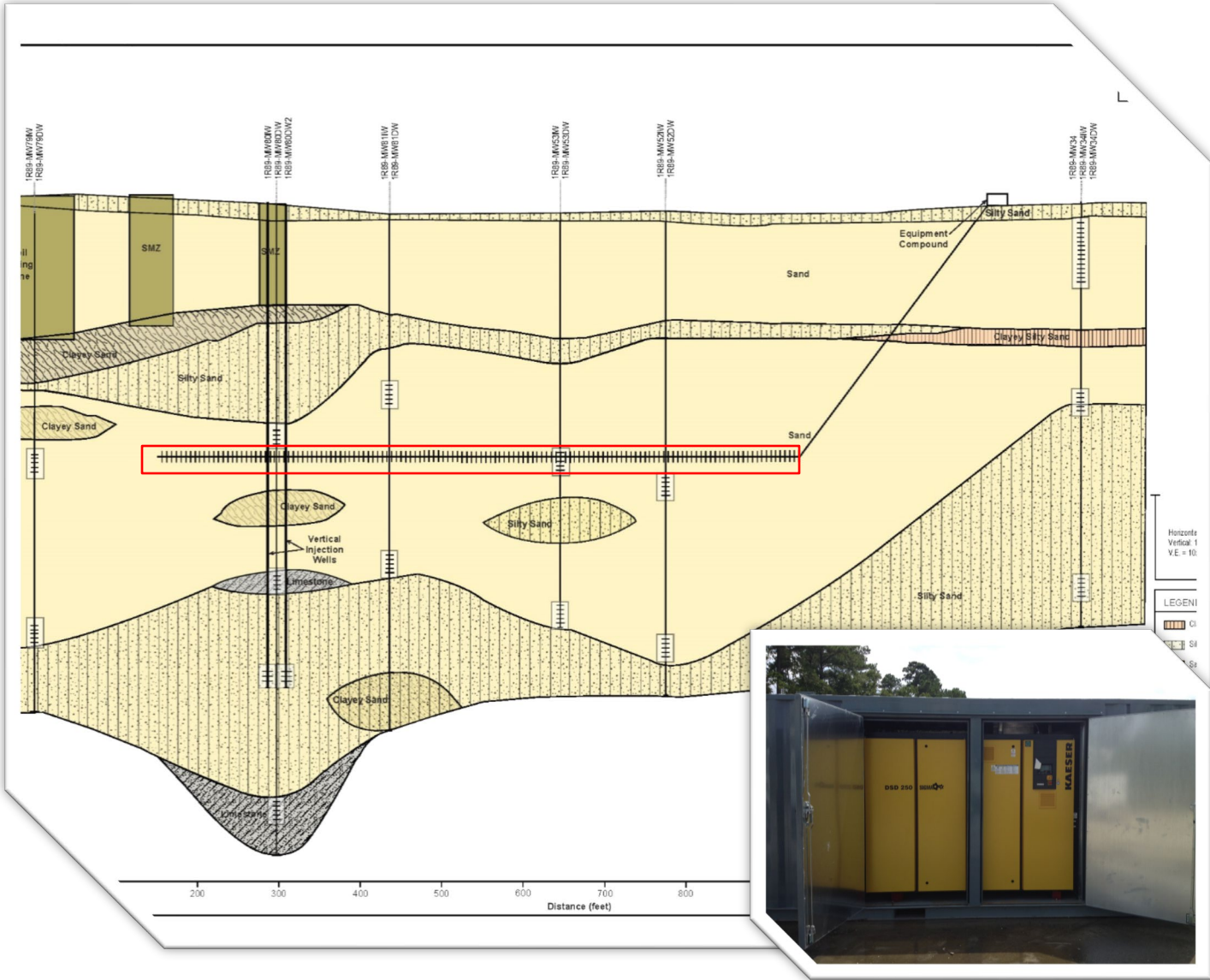
Site 89

- Former Defense Reutilization and Marketing Office (DRMO) and Base motor pool
- Primary contaminants
  - 1,1,2,2, - tetrachloroethane (PCA)
  - TCE
  - VC



SITE 89 AIR SPARGE

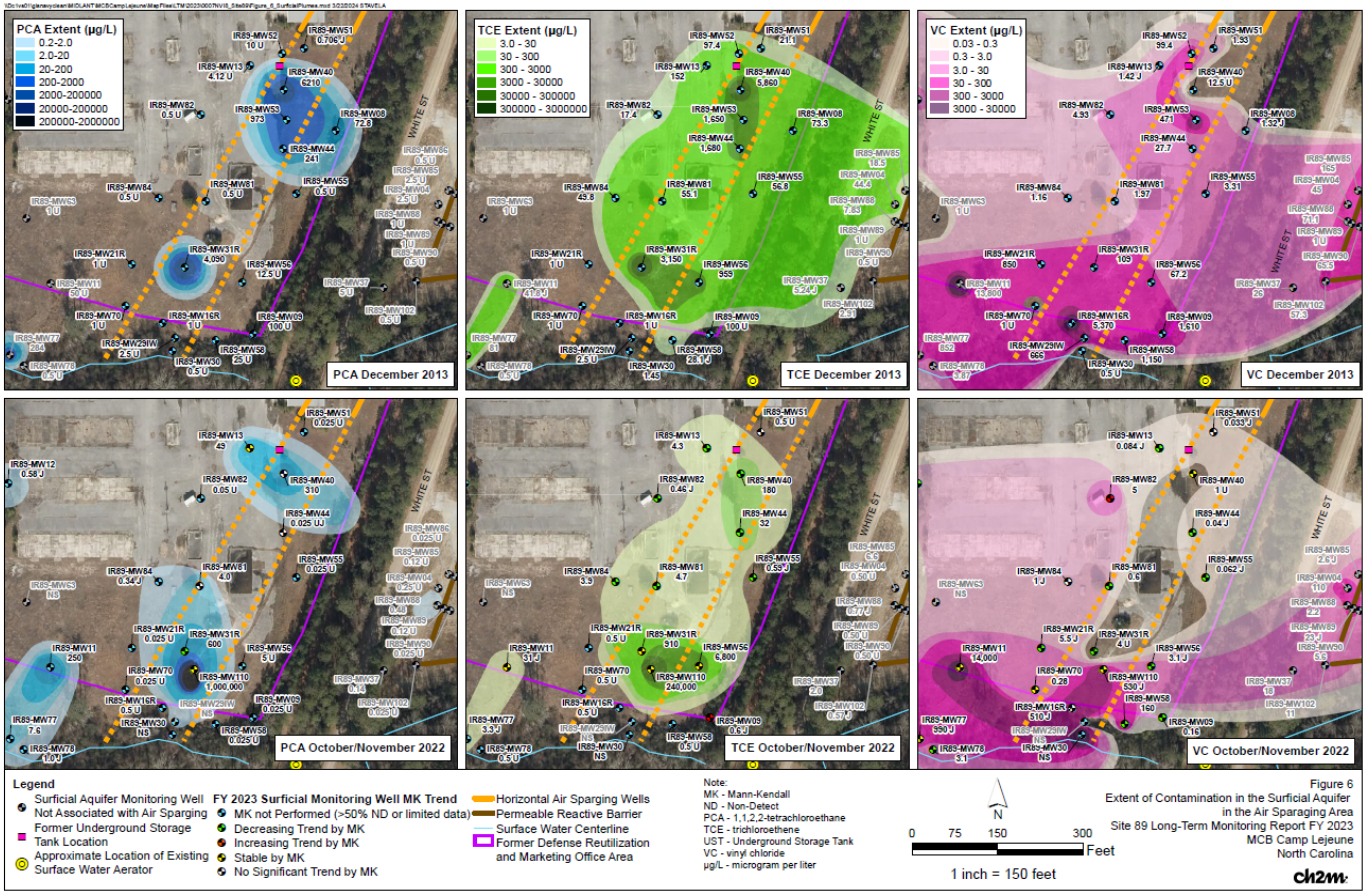
- **System consists of:**
  - 250 HP rotary screw compressor feeding -
  - Two "single entry" Horizontal AS wells
    - 4" Schd 80 PVC
    - 830' & 930' Total Length
    - 600' & 700' screen
    - 45' deep
  - Produces 200-260 cfm
  - Began operation in 2013
  - System remains fully operational and mechanically sound



SITE 89 AIR SPARGE

Site 89 Air Sparge System

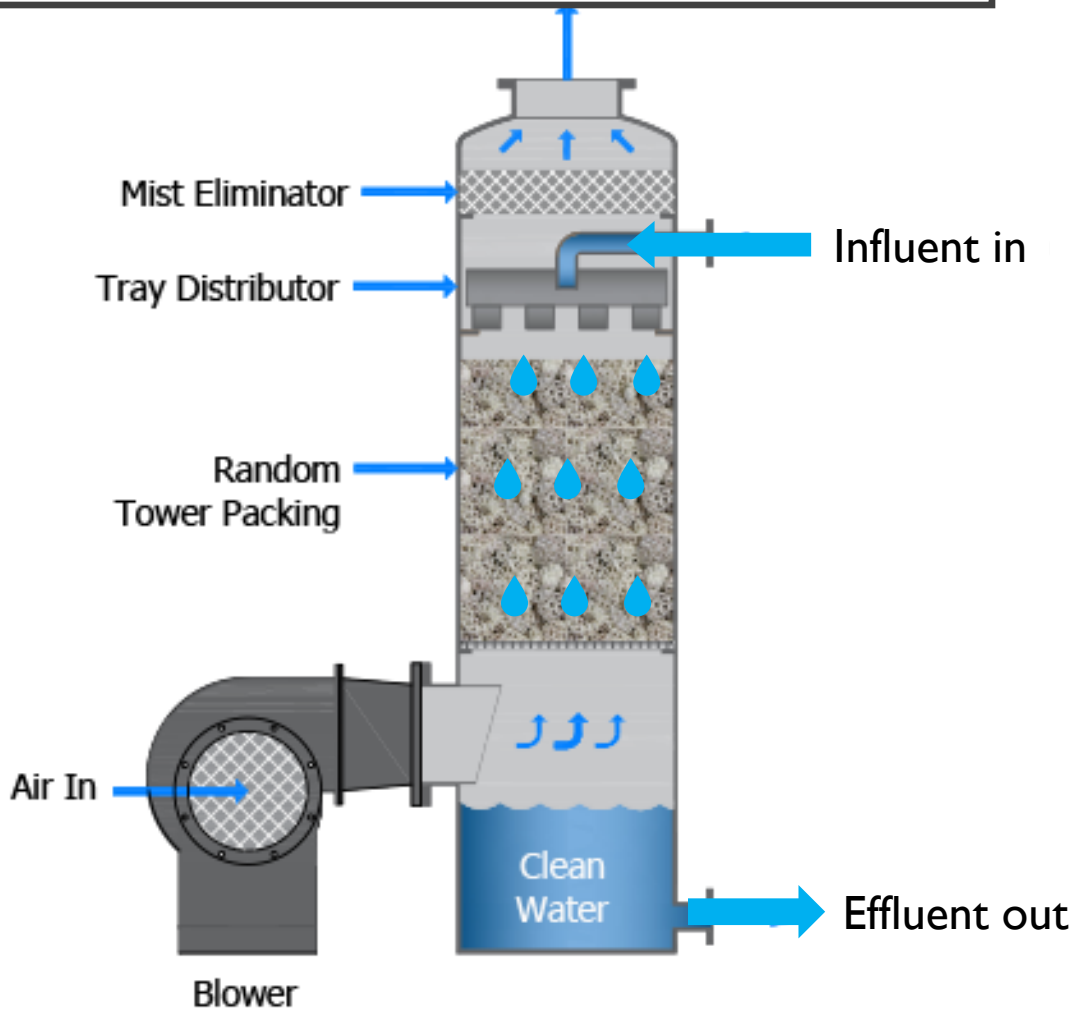
- Air sparging has had the most significant impacts reducing concentrations in northern vicinity
- Air sparging is only one of several treatment technologies used at Site 89



TREATMENT TECHNOLOGIES

Air Stripping

- Technology where extracted groundwater containing CVOCs is injected into the top of an air stripper and clean air is injected through the bottom
- Water separated into small droplets to maximize surface area
- Creates a counter current of influent and clean air volatizing dissolved VOCs out of solution and into gas phase



SITE 82 AIR STRIPPING

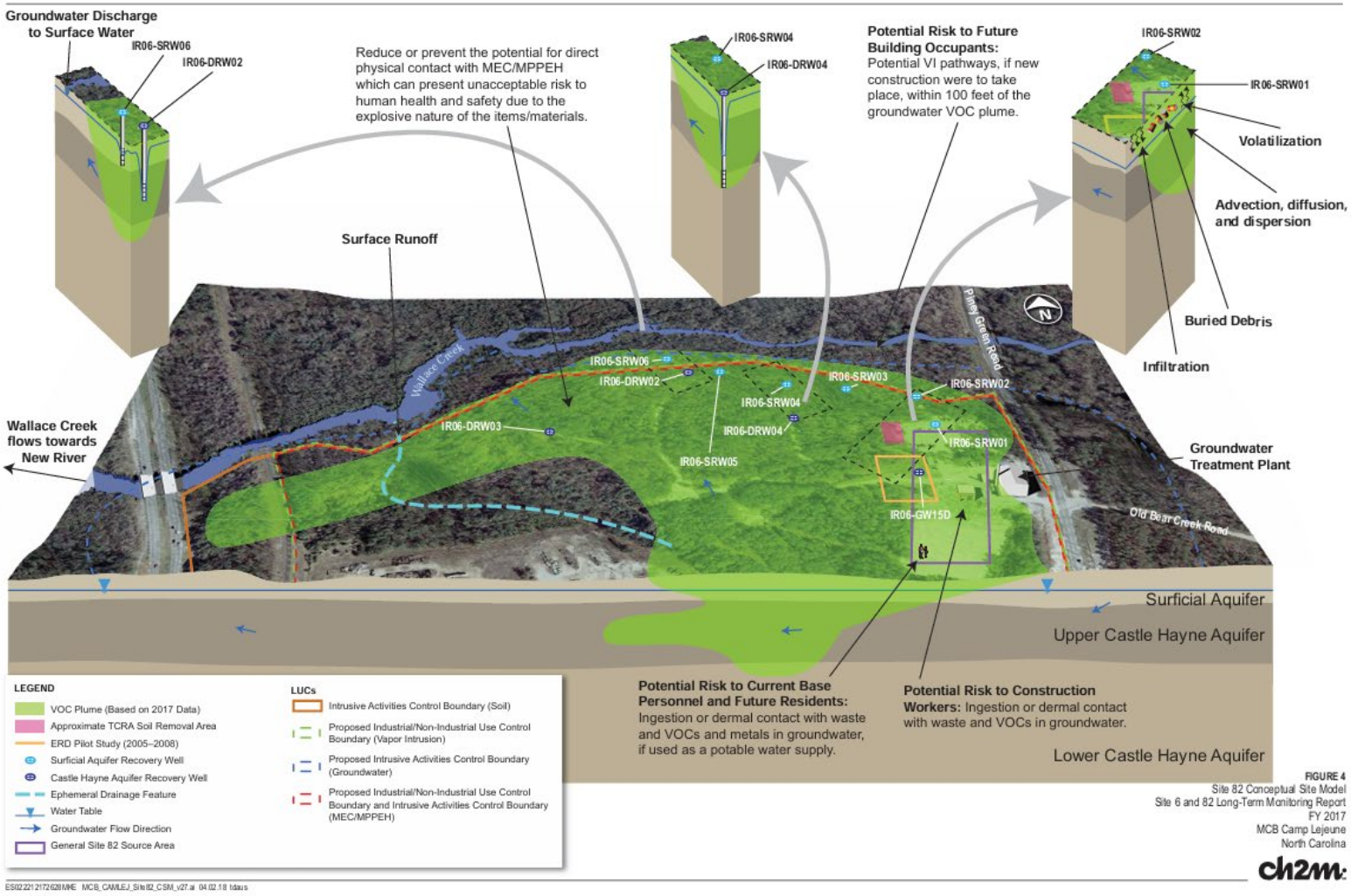
Site 82

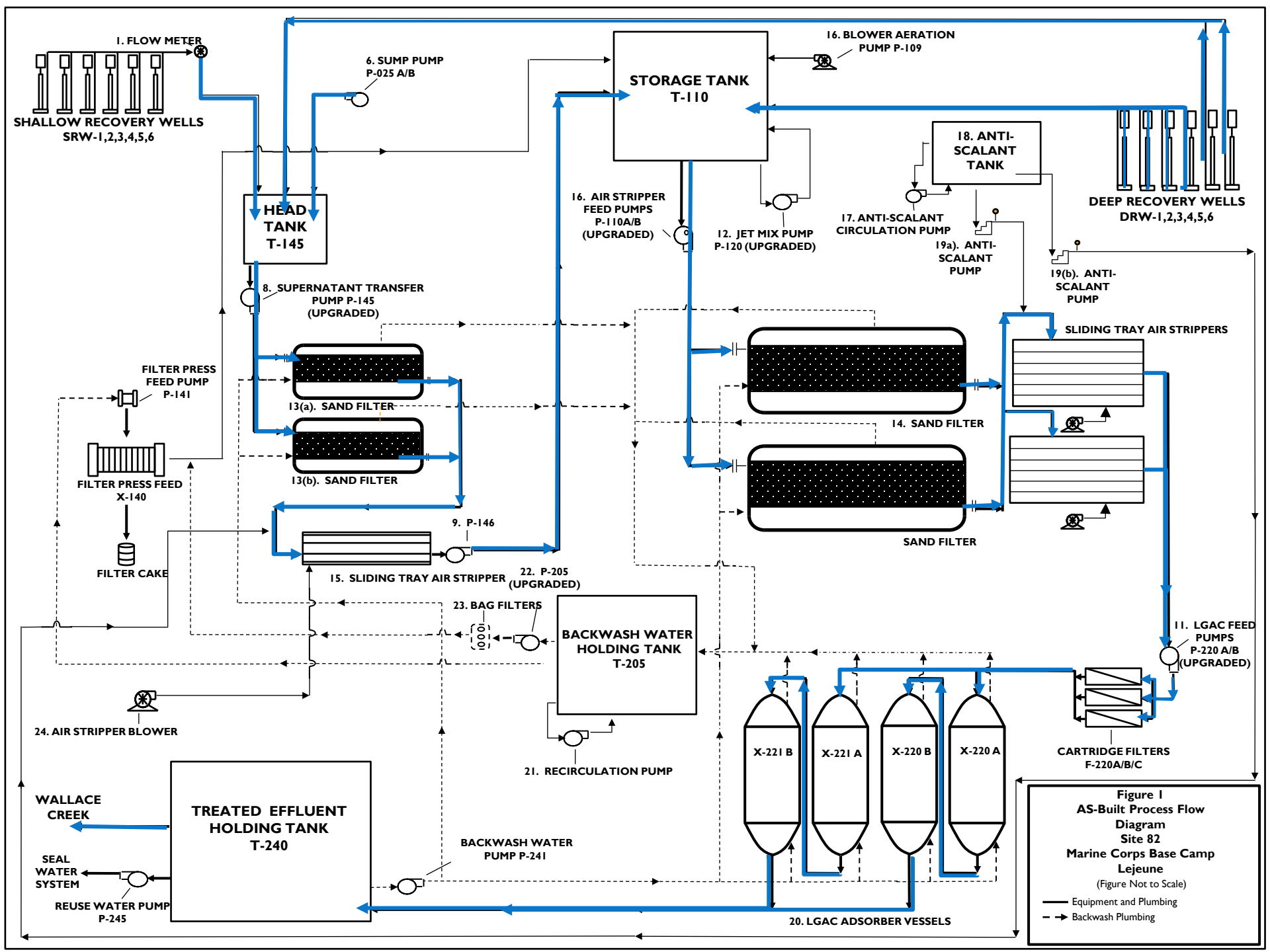
- Former Defense Reutilization and Marketing Office. Used for equipment and chemical storage, and disposal of and storage of wastes. Site 82 consists of the eastern portion of Lot 203
- Contaminants include CVOCs and metals – Shallow and deep aquifers
- Treatment system constructed in 1996 to treat CVOCs and metals (metals treatment for shallow influent only – Discontinued in 2009)

SITE 82 AIR STRIPPING

Primary CVOCs:

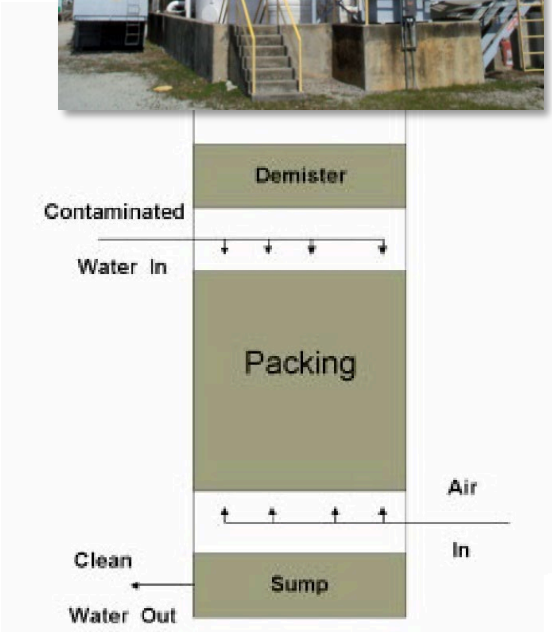
- Cis & Trans-1,2-DCE
- PCE
- TCE
- VC
- 1,1,2,2 - PCA
- 1,1,2-TCA
- 1,1-DCE

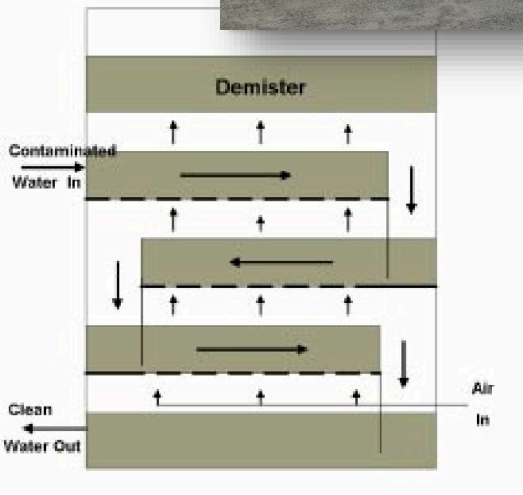



1. FLOW METER
SHALLOW RECOVERY WELLS
SRW-1,2,3,4,5,6
6. SUMP PUMP
P-025 A/B
STORAGE TANK
T-110
16. BLOWER AERATION
PUMP P-109
18. ANTI-
SCALANT
TANK
DEEP RECOVERY WELLS
DRW-1,2,3,4,5,6
HEAD
TANK
T-145
16. AIR STRIPPER
FEED PUMPS
P-110A/B
(UPGRADED)
12. JET MIX PUMP
P-120 (UPGRADED)
17. ANTI-SCALANT
CIRCULATION PUMP
19a). ANTI-
SCALANT
PUMP
19(b). ANTI-
SCALANT
PUMP
8. SUPERNATANT TRANSFER
PUMP P-145
(UPGRADED)
SLIDING TRAY AIR STRIPPERS
FILTER PRESS
FEED PUMP
P-141
13(a). SAND FILTER
14. SAND FILTER
13(b). SAND FILTER
FILTER PRESS FEED
X-140
FILTER CAKE
9. P-146
15. SLIDING TRAY AIR STRIPPER
22. P-205
(UPGRADED)
SAND FILTER
23. BAG FILTERS
BACKWASH WATER
HOLDING TANK
T-205
11. LGAC FEED
PUMPS
P-220 A/B
(UPGRADED)
24. AIR STRIPPER BLOWER
X-221 B
X-221 A
X-220 B
X-220 A
CARTRIDGE FILTERS
F-220A/B/C
21. RECIRCULATION PUMP
WALLACE
CREEK
TREATED EFFLUENT
HOLDING TANK
T-240
SEAL
WATER
SYSTEM
REUSE WATER PUMP
P-245
BACKWASH WATER
PUMP P-241
20. LGAC ADSORBER VESSELS
Figure 1
AS-Built Process Flow
Diagram
Site 82
Marine Corps Base Camp
Lejeune
(Figure Not to Scale)
Equipment and Plumbing
Backwash Plumbing

SITE 82 AIR STRIPPING

- Two primary types of air strippers:
  - Packed Column
  - Sieve Tray
- Site 82 has utilized both, currently using:
  - Two sieve trays treat combined influent
  - One dedicated shallow-influent sieve tray





SITE 82 AIR STRIPPING

- Pre-2016 data indicated incomplete and unreliable treatment from packed column tower air stripper
- Cause = Mineral fouling (iron & calcium) leading to channeling of water
- Impaired air stripping resulted in premature depletion on carbon filter media and CVOCs discharging to Wallace Creek
- To improve air stripping efficiency at Site 82:
  - A dedicate shallow influent sieve tray Air stripper was installed (2016)
  - The Packed Column tower was replaced by two sieve tray air strippers (2019)
- Since the installation of the three sieve tray air strippers, CVOC treatment efficiency has remained at 100%

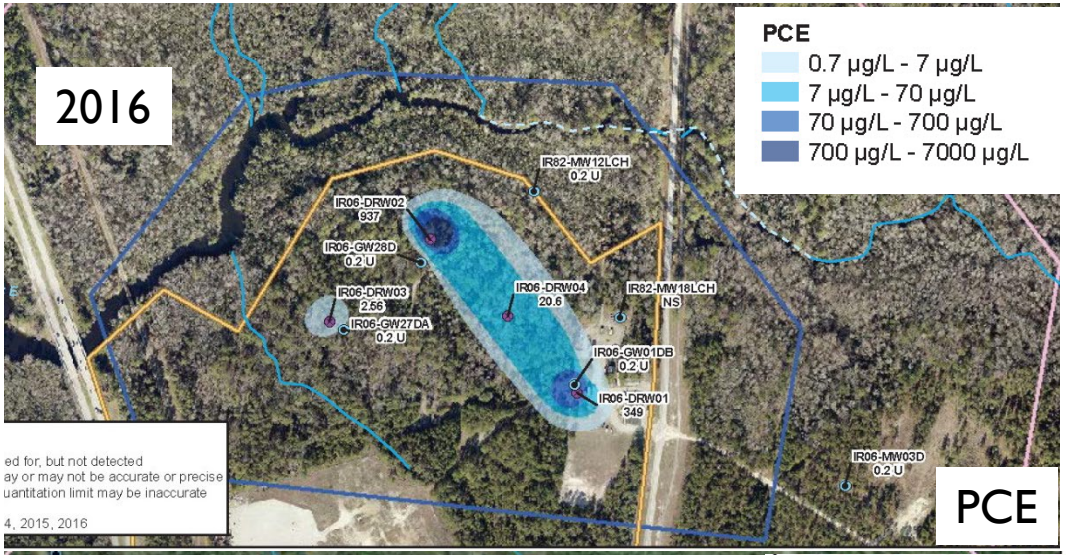
SITE 82 AIR STRIPPING

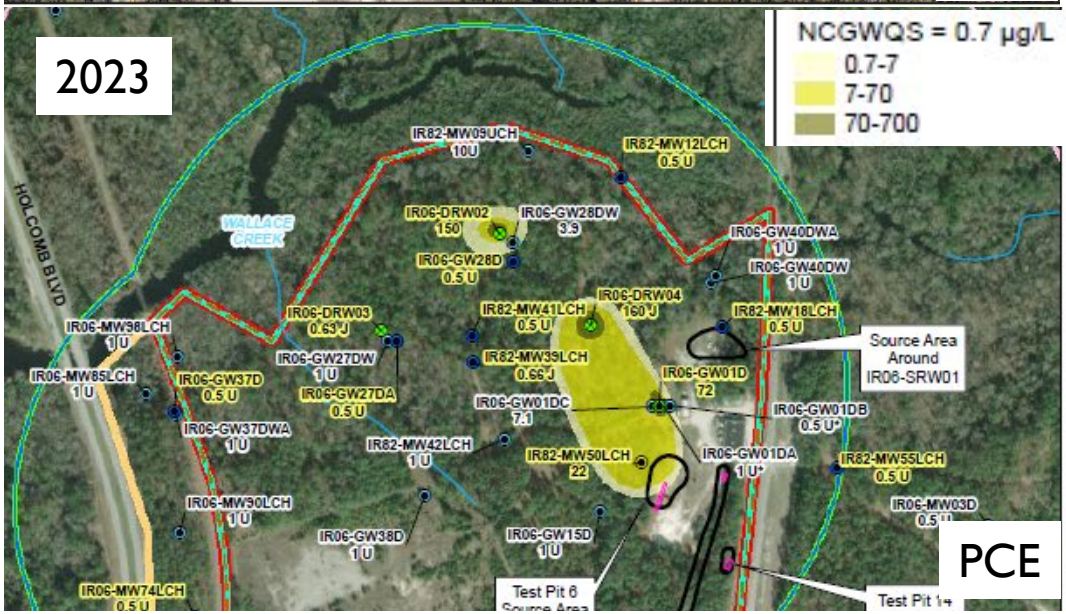
In addition to protecting Wallace Creek, improved air stripping has decreased required maintenance significantly

- GAC media replacement down from 1/year to > 5 years (last replacement 2020)
  - **Saving > $58k - $80K / Year ($290K to $400Ksavings to-date)**
- Backwashing of GAC and SF down from 1-3 / week to 1-2/month
- Cartridge filters changeouts down from 1-3/week to 2/month

SITE 82 AIR STRIPPING

- Currently the Site 82 GWTP treat **9-12 million gallons** of groundwater per month, and removes **100-250 lbs** of VOC mass from groundwater per month
- Since inception, the Site 82 GWTP has treated over **1.5 billion gallons** of groundwater, and removed approximately **225,000 lbs** of VOC mass from groundwater





SYSTEM O&M

Air Sparge

O&M for Air Sparge is generally low consisting of:

- Daily flow/ pressure readings
- Annual preventative maintenance:
  - Oil, filters, belts etc.
- Occasional repairs or replacement of mechanical components
- Repair of electrical damage from storms

SYSTEM O&M

Air Stripping

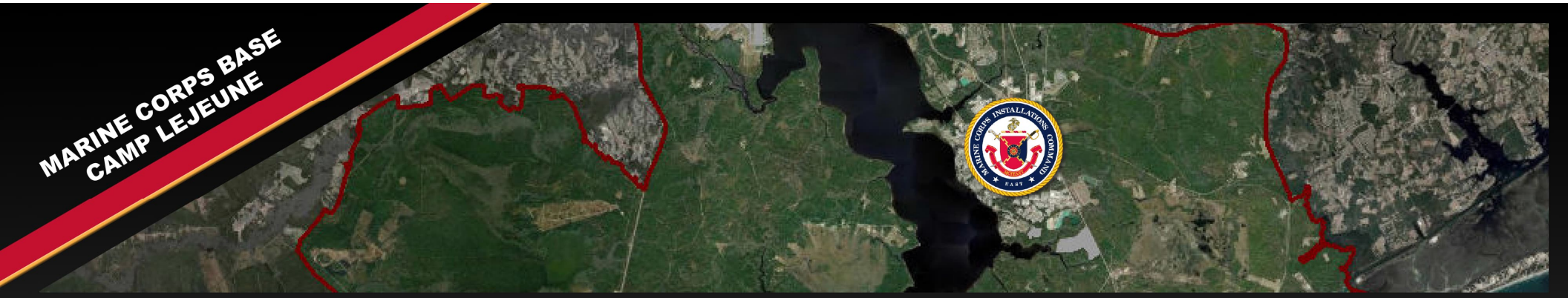
O&M efforts for air stripper units are generally low:

- Daily pressure readings
- Annual tray cleaning
- Annual gasket replacement
- Occasional blower or pump replacement / repair

Most O&M efforts are in support of supplementary equipment related to groundwater extraction:

- Daily system checks and flow readings
- Bi-weekly filter media (carbon and sand) backwashing
- Bi-weekly cartridge filters changes
- Monthly performance sampling
- Occasional extraction well pump cleaning

QUESTIONS



Pilot Study for Treatment of Perfluoroalkyl and Polyfluoroalkyl Substances in Liquid Investigation-Derived Waste

MCB Camp Lejeune

Restoration Advisory Board Meeting

August 20, 2025

Pilot Study Objectives

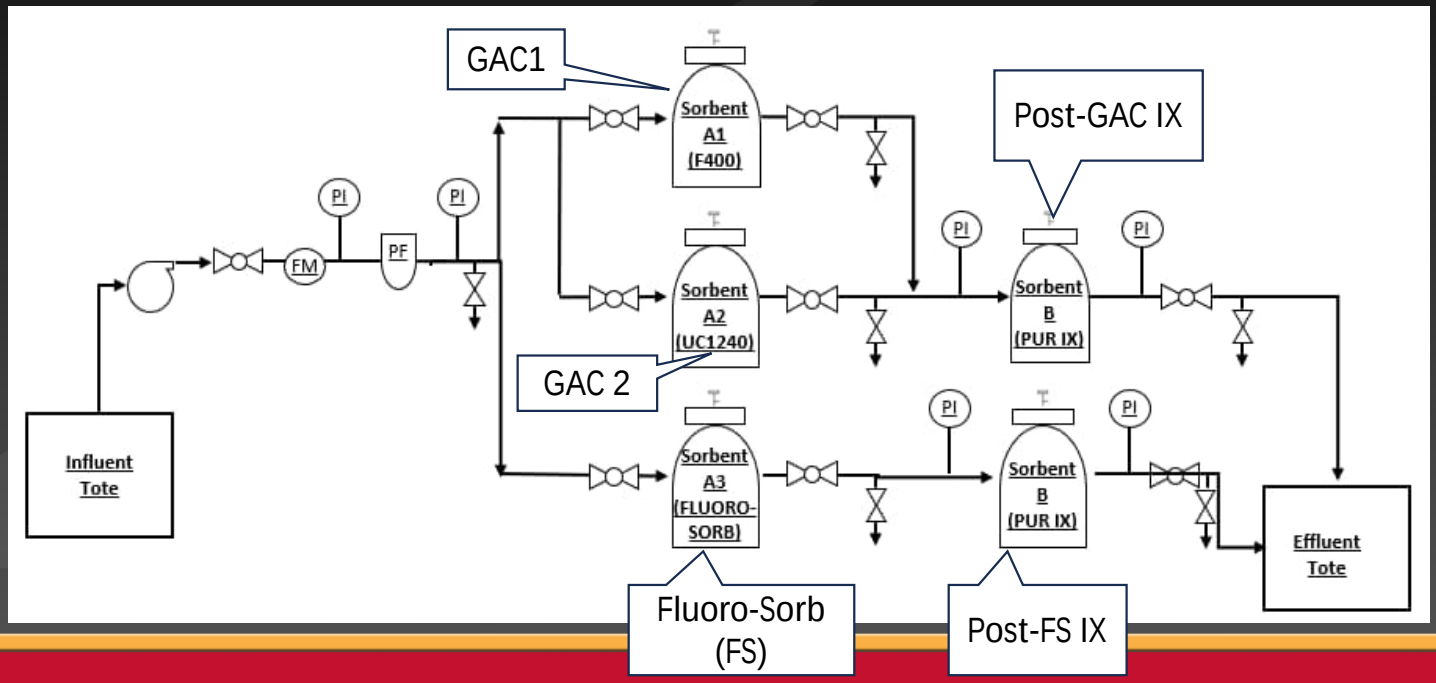
- Evaluate on-site treatment of liquid investigation-derived waste (IDW) generated during on-going investigations of perfluoroalkyl and polyfluoroalkyl substances (PFAS) to offer cost-effective flexibility
- Evaluate and select a technology to treat PFAS in liquid IDW to levels below 1 ng/L or laboratory detection limits for the 5 PFAS that had an EPA risk-based Regional Screening Level (RSL) in late 2022 (Final Work Plan, April 2023)*

* Changes in Department of Defense policy and regulatory guidance since the work plan have resulted in evaluating the 8 PFAS typically included in investigations against DoD-approved screening levels for Preliminary Assessments/Site Inspections

IDW Pilot Study System Design

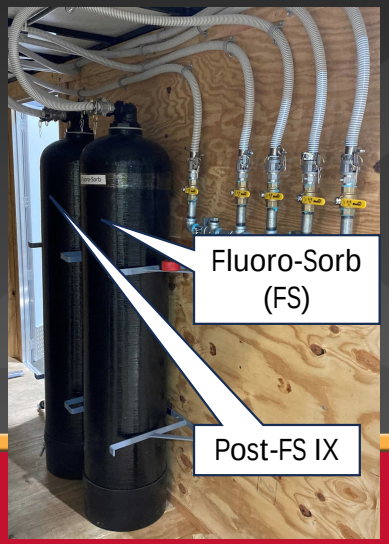
Three treatment trains with a primary adsorbent [granular activated carbon (GAC) or Fluoro-Sorb (FS)] followed by secondary ion exchange (IX) polishing

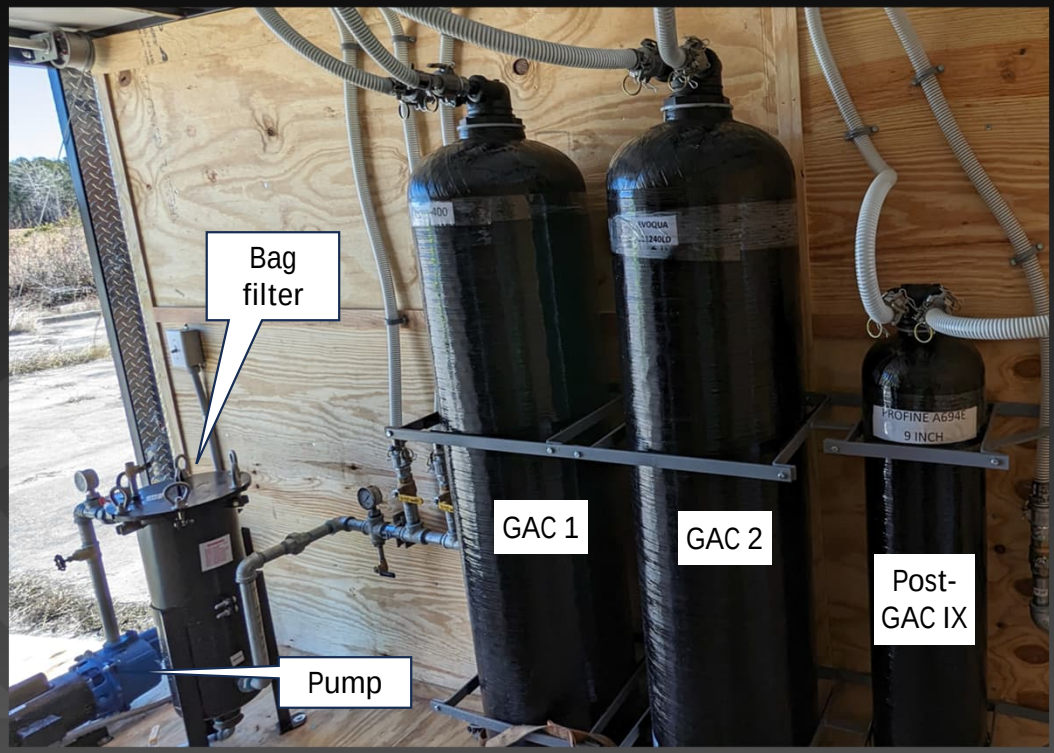
- GAC1 → Post-GAC IX
  Calgon F400 → Purofine A694E
- GAC2 → Post-GAC IX
  Evoqua UC1240LD → Purofine A694E
- FS → Post-FS IX
  Cetco Fluoro-Sorb → Purofine A694E



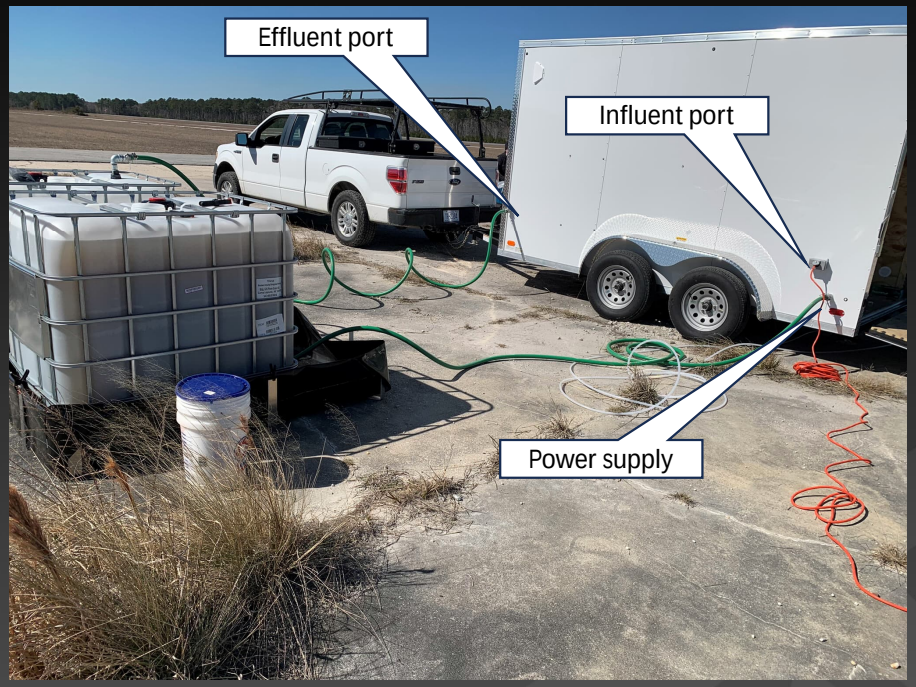
IDW Pilot Study System Design

- Bag filter to remove solids before treatment
- GAC trains designed for 3 gallons per minute (gpm)
- Fluoro-Sorb train designed for 8 gpm





Pilot Study Methods



- Conducted 3 pilot study runs (a 250-gallon tote each run) of groundwater from sites with high PFAS concentrations (5,000-35,000 ng/L)
- The pilot study runs were processed through each treatment train and samples were collected at each step of the treatment train
- In between the second and third pilot study runs ~3,700 gallons of other PFAS IDW was processed to load treatment media

Pilot Study Results

- For the 3 pilot study runs:
  - Effluent samples were non-detect for all PFAS with RSLs (Nov-2023), except for PFHxA and PFOS

	SL	Site 111 Inf.	Site 111 Eff.	Site 116 Inf.	Site 116 Eff.	Site 9 Inf.	Site 9 Eff.
	(ng/L)	(ng/L)	(ng/L)	(ng/L)	(ng/L)	(ng/L)	(ng/L)
PFOA	4.0	300	1.2 U	2,200	1.4 U	1,600	1.5 U
PFOS	4.0	2,300	0.92 U	25,000	2.6	11,000 D	0.83 U
PFHxA	990	300	0.92 U	5,300	0.51 J	1,200	0.75 J
PFHxS	10	2,900	1 U	9,000	1.2 U	4,000 D	1.3 U
PFBA	1,800	53	3.7 U	1,300	1.7 U	220	1.8 U
PFBS	600	280	0.92 U	1,300	0.76 U	45	0.83 U
PFNA	5.9	4.4	0.92 U	50 J	0.76 U	110	0.83 U

  - Individual post-sorbent samples collected throughout the treatment system were all below the pilot study goal of 1 ng/L except at Site 116, where PFOS influent concentrations were the higher than the other two pilot study runs by almost double

IDW Processing Results

- ~5,800 gallons of IDW has been treated by the IDW Pilot Study system
  - Sampled effluent total and (in some cases) influent total per IDW batch – 12 batches
  - Post-treatment samples consistently below SLs, except three batches
    - Two of these batches reprocessed with results below SLs. Third awaiting reprocessing
- After treating ~1,500 gallons through Fluoro-Sorb train, flow reduced to less than 1 gpm so use of Fluoro-Sorb train discontinued
- After treating ~2,100 gallons through UC1240 GAC train, effluent batch results indicates approximately 97% PFAS removal, but did not achieve the pilot study treatment goal
- The F400 GAC treatment train has treated ~2,900 gallons and is under further evaluation to remove PFAS

Operational Considerations

- Solids management
  - In one IDW run where effluent batch results exceeded SLs, solids were observed in effluent
  - Other two IDW runs where effluent batch results exceeded SLs possibly influenced by residual solids in the totes

- Flow capacity
  - System has processed approximately 6,500 gallons total
    - Both GAC/IX trains maintain design flow (3 gpm) with little pressure loss (3-5 psi)
    - FS/IX train has slowly reduced flow capacity-maximum flow less than 1 gpm with 13-15 psi loss

Path Forward

- Process remaining 2,500 gallons through the treatment system using GAC1 (F400) treatment train
- Confirm media breakthrough conditions
- Prepare pilot study report
- Explore disposal facilities for used media
- Evaluate potential reconfiguration
  - Need for IX
  - Backwash capability
  - Backwash liquid management
  - Enhance solids removal pre-treatment
- Evaluate long-term feasibility of treatment system